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Division of Truck Crops
Davis, California

Tighter Picking Sacks Reduce Surface Browning of Early White Rose Potatoes [1]

W. R. Barger [2] and L. L. Morris [3]

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Kern County early White Rose potatoes are often dug while immature and are severely skinned by the time they reach the packing house as a result of handling in digging, picking and hauling from the field. The skinned areas turn brown, sometimes within a few hours after digging if the potatoes are exposed to dry air. It has been shown that tubers subjected to wind [4] [5], develop more browning than if they are protected. For this reason, tarpaulins are sometimes placed over the sacks of potatoes when hauled from the field. The evidence indicates that any practice which favors moisture loss from the tubers also favors browning. The drying of washed potatoes with fans and the precooling of loaded cars with portable fans have caused an increase in browning. Whereas cooling in ice water and refrigeration in transit have been found to be beneficial in reducing browning.

The full extent of the injury from drying of skinned areas is difficult to detect at time of packing because only severely injured potatoes turn brown in this short time. It has been observed that browning continues to develop in transit. This injury not only detracts from the appearance of the tubers but it also predisposes them to bacterial infection that produces a sticky, slimy rot. This may develop to such an extent in transit that the bags will be "spotted" and wet upon arrival.

Test in the field

Kern County potatoes are commonly harvested in potato or grain sacks made of burlap but lightweight canvas sacks and fertilizer sacks made of fabric and lined with waterproof paper are used by some growers. It was thought that a tighter field container that would reduce drying might help to control browning. Tests were made at the Shafter Cotton Experiment Station on June 19, 1942, in which burlap potato sacks, burlap grain sacks of tighter weave than the potato sacks, 8 oz. canvas sacks, and fertilizer sacks were used for the harvesting of early White Rose potatoes. J. W. McNeil and Dan Barling cooperated by furnishing some of the sacks and J. C. Channeson furnished packing facilities.

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[1] Part of a cooperative investigation of methods of handling and shipping truck crops conducted by the U. S. Department of Agriculture and the California Agricultural Experiment Station.

[2] Associate physiologist, Bureau of Plant Industry, Soils, and Agricultural Engineering, U. S. Department of Agriculture, Fresno, Calif.

[3] Junior olericulturist, California Agricultural Experiment Station, Davis, Calif.

[4] Rose, Dean H., and D. F. Fisher. Desiccation effects on skinned potatoes. American Potato Journal 17:287-289, 1940.

[5] Barger, W. R., G. B. Ramsery, R. L. Perry and John H. MacGillivray. Handling and shipping tests with new potatoes from Kern County, California. California Agricultural Experiment Station Bulletin 664:1-24, 1942.

The experimental lots were dug about 2:00 P.M. The crop was about 4 months from planting and the skin of the tubers was fairly well set but considerable skinning occurred during harvest. The potatoes were picked up immediately after digging and the various sacks allowed to stand in the field about 1½ hours before they were hauled to the packing house about 2 miles away. Since the day was relatively cool and calm, the potatoes were purposely held in the sacks on the packing house platform for about 3 hours before washing. After each lot was washed and graded separately, the tubers were inspected by members of the Federal-State Shipping Point Inspection Service.

During the time the potatoes were harvested and hauled to the packing house there was a very little wind. In table 1 it will be seen that the maximum temperature for the day was only 90° F but the low humidity of 10 to 15 per cent was sufficient to cause injury even though there was but little wind. During the 1½ hours that the sacks were left in the field, slight browning indicating wind or dry air injury developed on the tubers in the potato sacks but no evidence of injury developed in the other sacks. The amount of browning found after washing is shown in table 2. There was about 80 per cent less browning at this time in the lot handled in canvas sacks than in the lots in which potato and grain sacks were used. Browning occurred on less than 2 per cent of the tubers in the fertilizer sacks in comparison with about 6 per cent in the canvas sacks. All the potatoes harvested in potato and grain sacks had to be thrown into a lower grade than those in canvas and lined sacks.

Table 1. - Temperature and humidity record at Shafter, June 19, 1942

Time	Air temp.	Rel. hum.	Soil temperature			Internal temp. of potatoes when picked up
			at surface		6" below surface	
			Before digging	After digging	Before digging	
	°F	%	°F	°F	°F	°F
7 a.m.	67	48	65	--	74	65
9 a.m.	75	32	95	--	75	73
12 noon	85	20	118	95	83	78
1 p.m.	88	15	120	93	85	85
2 p.m.	90	19	120	95	85	88
3 p.m.	88	15	120	93	86	90
6 p.m.	89	10	80	--	86	--

Table 2. - Percentage of tubers, by weight, showing browning after handling in various type sacks (5 hrs. after digging)

Picking sack	Per cent browning (slight to moderate)
Burlap potato	33.0 (200 lb. sample)
Burlap grain	29.5 (" " ")
Canvas	6.3 (" " ")
Fertilizer	1.5 (400 " ")

Shipping Test

Tubers from the potato and grain sacks were shipped to Chicago in various types of shipping bags. These tubers showed an average of 31 per cent browning when shipped. Upon arrival, considerablo surface decay and additional browning had developed. Tubers shipped in paper bags showed more surface decay than tubers shipped in either burlap or cotton sheeting bags. These results are additional evidence that excessive drying of the tubers before going into the car is an important factor determining arrival condition and that any practice designed to reduce drying during harvest and packing should be beneficial.

Practical Considerations

Apparently the porosity of field sacks may have considerable effect on the shipping quality of new potatoes. Harvesting in light weight tightly woven canvas sacks greatly reduced "wind injury" of skinned potatoes and subsequent browning. Used fertilizer sacks having paper linings were also effective in this respect but they were too stiff for easy handling by the pickers. Burlap grain sacks were apparently no better than potato sacks even though they were somewhat heavier and of tighter weave.

The fact that browning or injury causing browning may occur on days that are not unusually hot and windy is shown by this test. Shippers and inspectors have observed during normal warm weather in Kern County that skinned potatoes from the same field dug in the afternoon show more browning and cannot be graded as high as those dug in the morning. Excessive drying of unprotected potatoes due to the low humidity that prevails in the afternoon is undoubtedly responsible for lowering the grade in many instances.

Not all the potatoes that were injured by dry air during the harvesting of this test turned brown in the five-hour handling period before loading. The full extent of the injury did not develop until after the potatoes were shipped.

Although this report covers only one test, the nature of surface browning of new skinned potatoes and the factors which cause it add support to the results obtained. It appears that the use of light weight canvas or similar fine woven material for picking sacks for Kern County potatoes would decrease surface browning and result in better condition on arrival at the market. Such bags may not be available in quantities desired at the present time. However, it would be well to bear in mind that protection of the tubers from sun and air when in the field or in transit to the shed is desirable. An attempt will be made to secure more experimental information on this subject.

April, 1943